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13. SUPPLEMENTARY NOTES

14. ABSTRACT The overarching goal of the current grant is to develop valid and reliable computerized tools to measure and modify anger-related cognitive biases and ultimately to examine their efficiency in reducing anger and adjustment difficulties among soldiers returning from deployment. The first aim of the research, addressed in Study 1, was to measure the associations between state and trait anger and biases in anger-related attention and interpretation. During the past year, 211 undergraduate students were recruited and participated in Study 1. The key findings so far suggest that in a sub-group tested on a faces-based dot probe task (N=101), significant associations were found between attention bias toward angry faces and self-reported anger and aggression measures, as well as between attention bias toward angry faces and the tendency to judge more faces as angry rather than happy in an emotion detection task. In addition, a significant positive correlation was found between self-reported anger and aggression and the tendency to judge faces as angry faster than as happy in the emotion detection task. These results indicate that the main thrust of the grant is now grounded in evidence of significant associations between low-level cognition measured via implicit performance on computerized tasks and self-reported anger and aggression. Thus, we can now move forward devising and testing cognitive modification tools.

15. SUBJECT TERMS anger, aggression, attention bias, interpretation bias, cognitive bias modification

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INTRODUCTION

To enhance military performance in combat, soldiers learn to selectively attend to potential threats and to weigh any ambiguous information in the context of potential life-threatening danger. The development of such cognitive biases is expected to enhance soldiers' life preserving actions that among others include the use of combat-related aggressive action. Although the tendency to promptly and aggressively respond to potential threats in combat is crucial for survival, it may prove maladaptive in non-combat environments. Since deployed soldiers confront dramatic changes in environmental threat conditions, ranging from safety to acute danger, considerable plasticity in threat-related attention and threat interpretation is required. Insufficient plasticity in threat processing may confer risk for military performance and psychological adjustment both in theatre and upon reintegration back to civilian environments.

The overarching goal of the current grant is to develop valid and reliable computerized tools to measure and modify anger-related cognitive biases and ultimately to examine their efficiency in reducing anger and adjustment difficulties among soldiers returning from deployment. This goal will be achieved through unique research collaboration between WRAIR and Tel Aviv University offering a combination of experts in advanced psychological research in military context and in translational cognitive-neuroscience research.

BODY

The project progressed as expected during its first year except that we have collected valid data from 211 participants (Study 1 of the grant) and not 300 as expected. The results with the current sample are quite stable but we will make an effort to recruit additional subjects.

Study materials preparation

We completed development of all the relevant material for study 1, including programming computerized tasks, adjusting the tasks length and stimuli to the specific needs of the current study, installing the tasks on all lab computers, and quality-control for all the computerized elements of the study. We also prepared all the necessary written materials, such as consent forms and self-report questionnaires. We obtained IRB approval.

Staff recruitment and training

We recruited research assistances for the study and trained them on all the aspects of running the experiment and recoding the data from the self-report questionnaires. We also trained the RAs on all aspects related to contact with potential participants and scheduling the experimental sessions.

Recruitment of participants and data collection

211 undergraduate students have participated in study1.

Data recoding and preparation:

All the data obtained from the study was coded and has been prepared for analysis.

Data analysis:

Study 1 data was analyzed. We are currently in the process of writing a scientific paper reporting the findings from Study 1.

Preparation for the next study:

The next study being prepared for running during the current academic year relies on the significant results concerning interpretation bias emanating from Study 1 and informed by a published study by a British group (Penton-Voak et al., 2013). This study will be conducted as a two-site study in collaboration with researchers from the University of Bristol, who use similar methods to modify interpretation biases as we have proposed in our original grant. Both sites will run both procedures that closely correspond to our outlined Study 6. As proposed, we hope determine: a) whether this cognitive bias modification is effective in reducing interpretation biases and anger levels; and b) which of the two highly similar protocols is more effective in

reducing anger and anger susceptibility. All materials were prepared and research staff was trained to run this study. Data collection is expected to start shortly.

Problem areas

No real problems were encountered in conducting the study, except perhaps for slightly slower recruitment of participants than expected.

Future plans

We plan to complete the next study during this academic year and prepare for Study 5 targeting anger-related attention biases.

KEY RESEARCH ACCOMPLISHMENTS

- Materials preparation for study 1.
- Staff recruitment and training for study 1.
- Data collection from 211 undergraduate students who participated in study 1.
- All data from study 1 has been coded and analyzed.
- Key findings: significant correlations were found between anger-related attention and interpretation cognitive bias measures and self-reported anger and aggression measures.
- In the process of writing a scientific paper reporting Study 1 findings.
- Materials preparation and staff training for the next study (6).

REPORTABLE OUTCOME

The key findings from study 1 suggest that in the group which preformed the face-version of the dot probe task (N=101), significant correlations were found between attention bias toward angry faces in the dot probe task and self-reported anger and aggression measures, as well as between attention bias toward angry faces and the tendency to judge more faces as angry rather than happy in the emotion detection task. In addition, a significant positive correlation was found between self-reported anger and aggression measures and the tendency to judge faces as angry faster than as happy in the emotion detection task.

These results indicate that the main thrust of the grant is now grounded in evidence of significant associations between low-level cognition measured via implicit performance on computerized tasks and self-reported anger and aggression. Thus, we can now move forward devising and testing cognitive modification tools.

CONCLUSION

Both anger-related attention biases and anger-related interpretation biases were found to be associated with levels of self-reported anger. These associations were in the hypothesized direction, i.e. greater attention to anger-related stimuli, and faster judgment of facial stimuli as angry, were both associated with higher self-reported anger levels. These results add new evidence for the potential role of attention and interpretation biases in anger, and indicate that the main thrust of the grant is grounded in evidence of significant associations between low-level cognition measured via implicit performance on computerized tasks and self-reported anger and aggression. It is important to note that since Study 1 was a correlational study, inference regarding causality is restricted, and will be further examined in the next studies, as planned.

REFERENCES

Penton-Voak, I. S., Thomas, J., Gage, S. H., McMurran, M., McDonald, S., & Munafò, M. R. (2013). Increasing recognition of happiness in ambiguous facial expressions reduces anger and aggressive behavior. *Psychological science*, *24*(5), 688–97. doi:10.1177/0956797612459657